Daily Report for 2025-11-18

N. Kenmochi

Date: November 18, 2025
Time: 10:00 – 18:45
Shot: 197071 –197221 (151 shots)
Prior wall conditioning: No
Divertor pump: On
Gas puff: H_2
NBI: #1, #2, #3, #4, #5
ECH: 5.5-UO (77GHz), 2-OUR (77GHz), 2-OUL (154GHz), 2-OLL (154GHz)

Topics

1. Conclusion of lithium granule injection series for plasma modification and supplemental wall conditioning (R. Lunsford, S. Masuzaki)
2. Investigation of local and non-local turbulence during cold pulse propagation by TESPEL injection (N. Kenmochi)
3. Turbulence characteristics in density-peaking plasma in LHD (R. Yanai)
4. Comparison of turbulence characteristics in different EVDF conditions (R. Yanai)
5. Observation of electron cyclotron maser instability during the fundamental X-mode ECCD in the extremely low dense plasma (H. Igami)

Conclusion of lithium granule injection series for plasma modification and supplemental wall conditioning

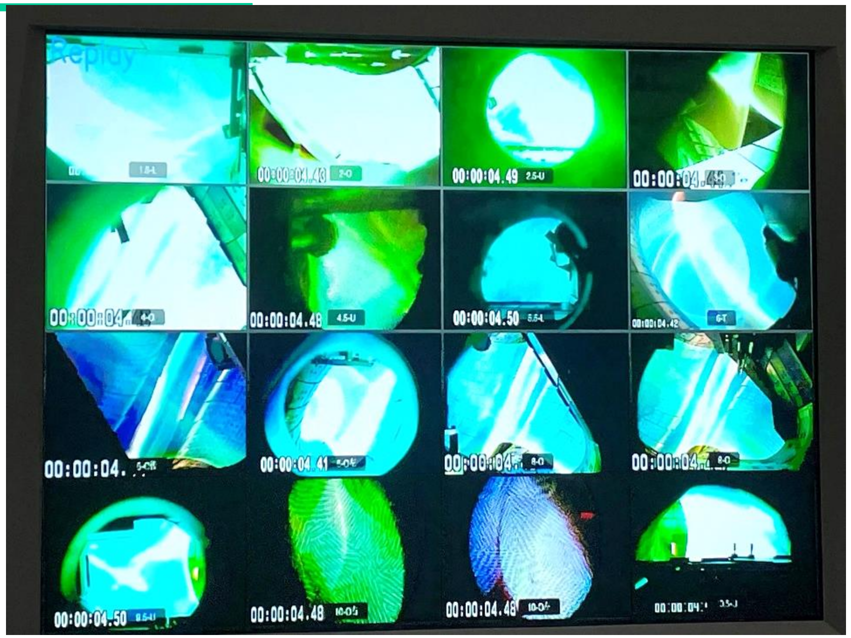
R. Lunsford, S. Masuzaki, M. Shoji, N. Tamura, F. Nespoli, N. Pablant

Experimental conditions:

(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CW, 2.75 T, 1.2538, 100.0%)
#197071 - #197093

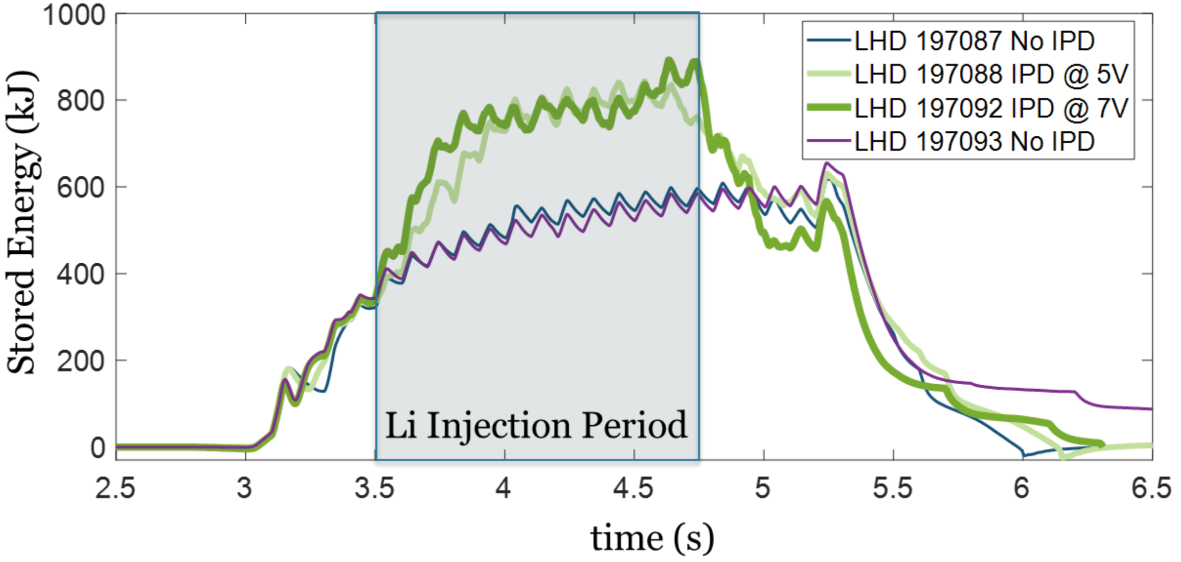
Motivation and method:

- One IPD reservoir with 500 micron Li granules used
- Test assimilation of smaller granules at lower density for greater discharge affect.
- Conduct repeated discharges at optimal rate for attempted layer formation.
- TESPEL injection coincident with granule injection to examine transport changes at elevated confinement



Results:

- 23 Discharges (12 with Li, 11 without Li)
- No radiative collapse due to Li injection
- Strong performance improvement with Li injection
- Wall Conditioning results presently inconclusive but further analysis needed



Investigation of local and non-local turbulence during cold pulse propagation by TESPEL injection

N. Kenmochi

Experimental conditions:

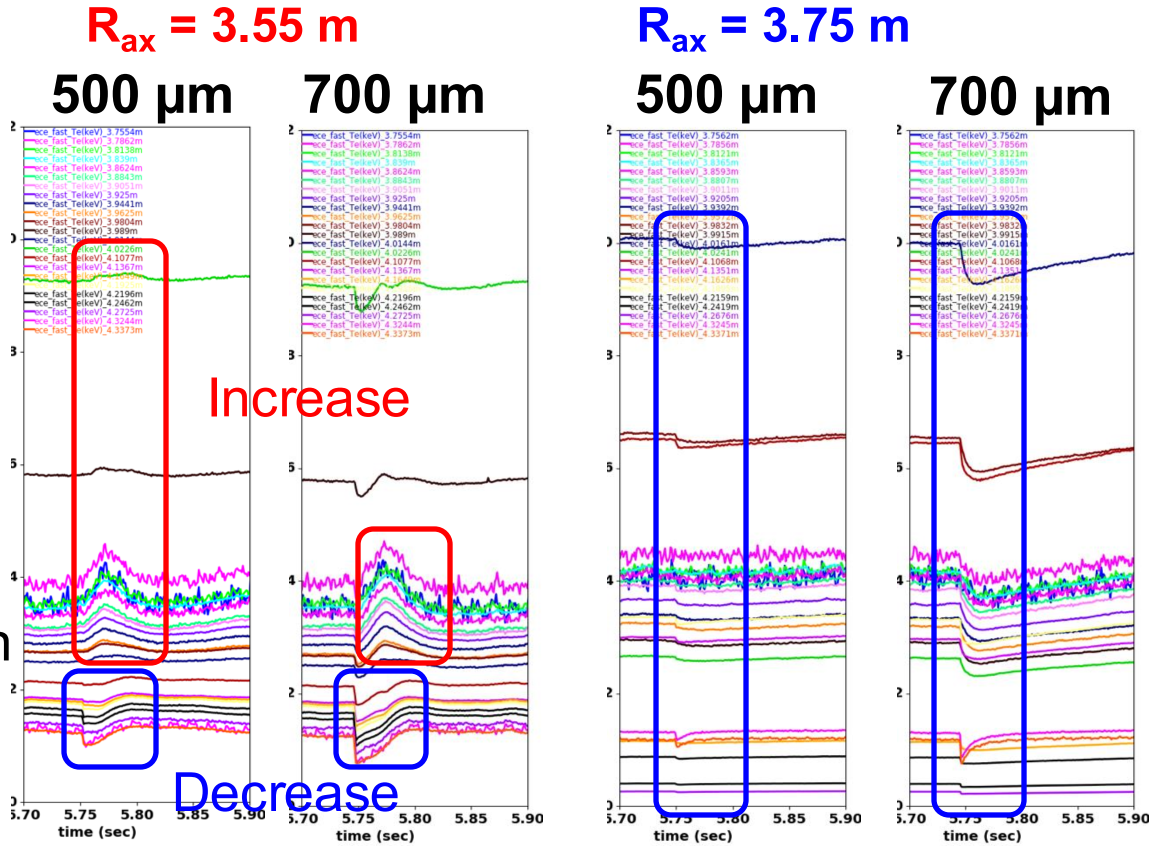
(R_{ax}, Polarity, B_t, γ, B_q) = (3.55 m, CW, 2.7887 T, 1.2538, 100.0%) #197095 - #197130
= (3.75 m, CW, 2.64 T, 1.2538, 100.0%) #197131 - #197166

Motivation and method:

- Investigate the characteristics of nonlocal turbulence during cold pulse propagation by measuring turbulence and conducting experiments under different TESPEL size and magnetic field configurations.

Results:

- ✓ Successful acquisition of experimental data for two TESPEL sizes(500, 700 um) and two magnetic fields.
- ✓ Cold pulse propagations were observed.
- ✓ At the 3.55m configuration, nonlocal response (peripheral temperature decrease, central temperature increase) was observed, whereas no clear nonlocal response was observed at the 3.75m configuration.
- ✓ FTS and Fast CXS and Positional scan data of BS and HIBP measurements have been successfully taken
- ✓ Based on the results of temperature and turbulence measurements, the mechanism of local/non-local transport will be investigated.



Investigation of local and non-local turbulence during cold pulse propagation by TESPEL injection

N. Kenmochi

Experimental conditions:

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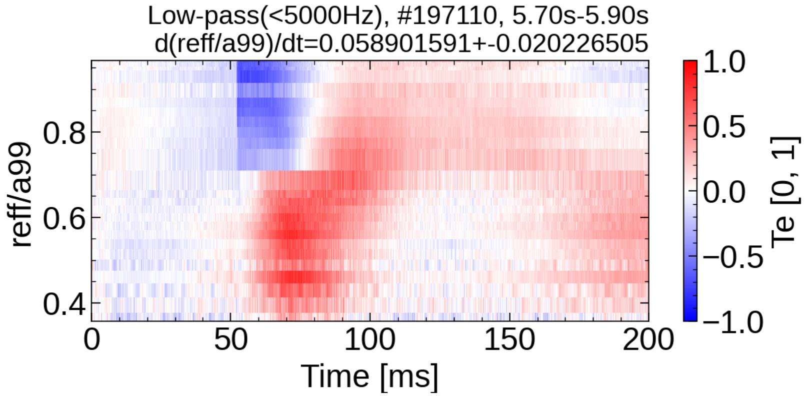
= (3.75 m, CW, 2.64 T, 1.2538, 100.0%) #197131 - #197166

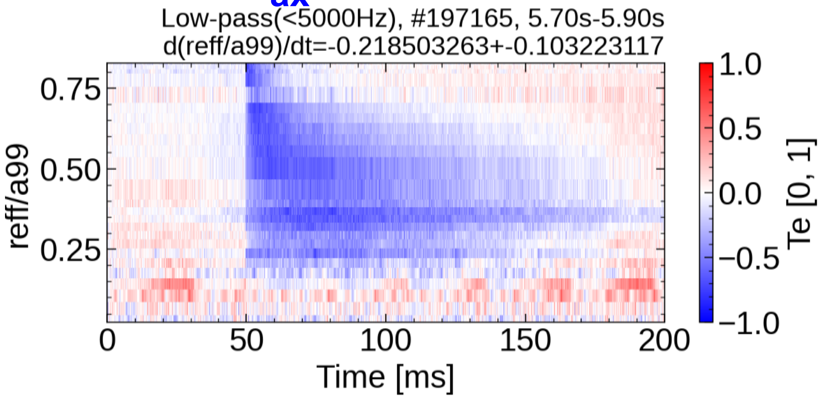
Motivation and method:

- Investigate the characteristics of nonlocal turbulence during cold pulse propagation by measuring turbulence and conducting experiments under different TESPEL size and magnetic field configurations.

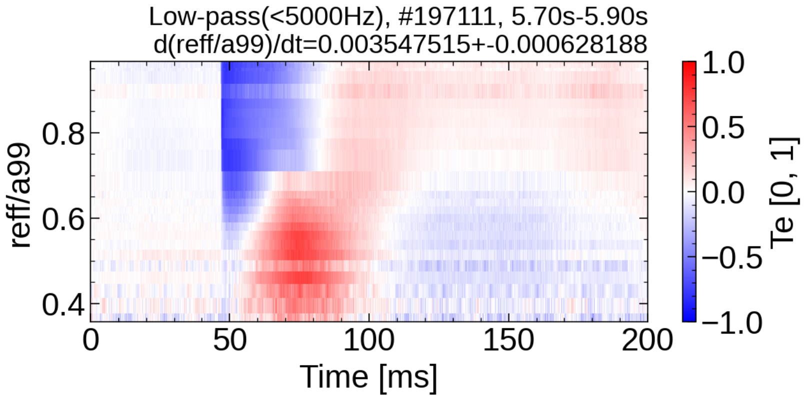
R_{ax} = 3.55 m | **R_{ax} = 3.75 m**

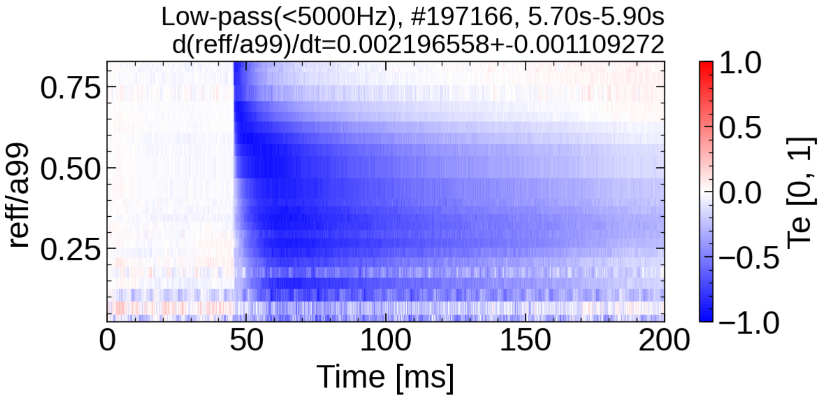
500 µm





700 µm





- ✓ The larger the TESPEL size, the deeper the cold pulse penetrates.
- ✓ The characteristics of core temperature rise at the 3.55 m configuration may not significantly depend on pellet size.

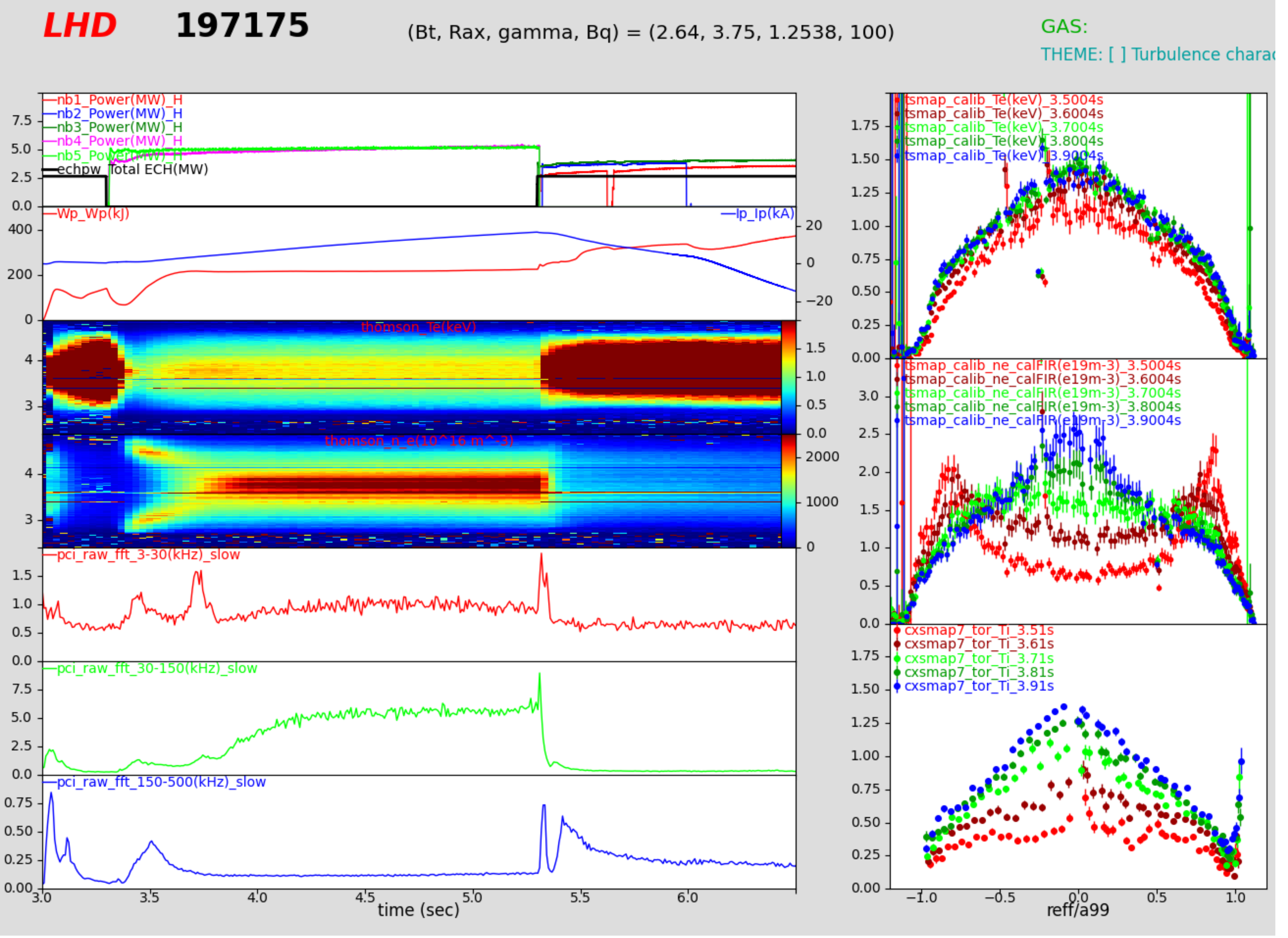
Turbulence characteristics in density-peaking plasma in LHD (R. Yanai and M. Nishiura)

Shot #: 197168 – 197179

Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (3.75 m, CW, 2.64 T, 1.2538, 100 %)

Motivation and objective:

- This experiment was conducted to investigate the turbulence characteristics in the density peaking plasma and to elucidate the mechanism forming the density peaking profile.



Results:

- Hollow density profile of ECH startup plasma gradually changed to peaked profile by only injecting perpendicular NBIs. This change took about 0.5 s.
- Density fluctuation intensity between 30-150 kHz measured by PCI increased as the density profile became peaking.
- We will check other data such as BS and CECE later.

Comparison of turbulence characteristics in different EVDF conditions (R. Yanai and H. Yamaguchi)

Shot #: 197180–197187,197201–197209

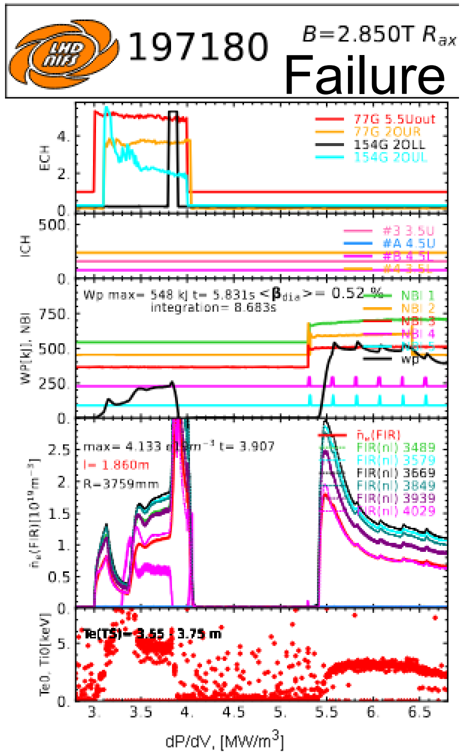
Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CW, 2.85 T, 1.2538, 100 %)

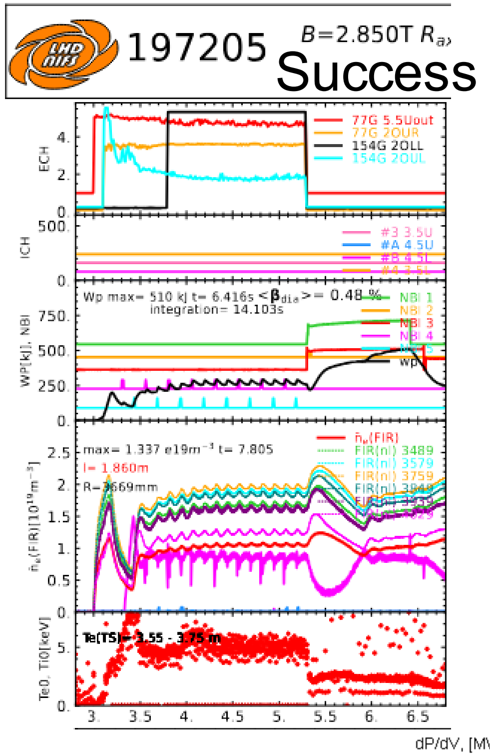
Motivation and objective:

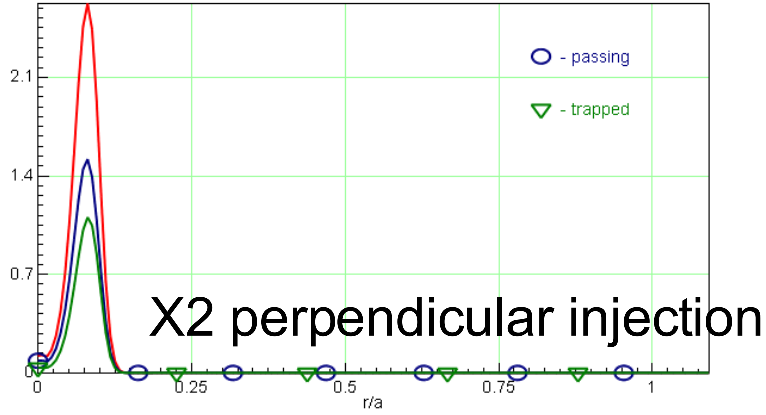
- This experiment was conducted to investigate the influence of the electron velocity distribution function (EVDF) manipulation by ECH on turbulence.

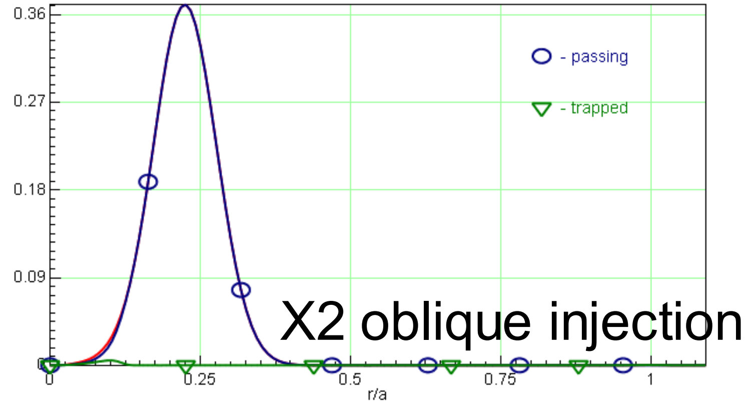
Results:

- The perpendicular ECH injection with X2-mode were failed in a few shots at first due to the miscalculation of the polarization setting.
- After rearrange the polarization settings, the perpendicular ECH injection was succeeded. A raytrace calculation showed higher power absorbed in trapped particles by perpendicular X2-mode ECH.
- The obtained turbulence data such as PCI, BS, and CECE will be analyzed later.









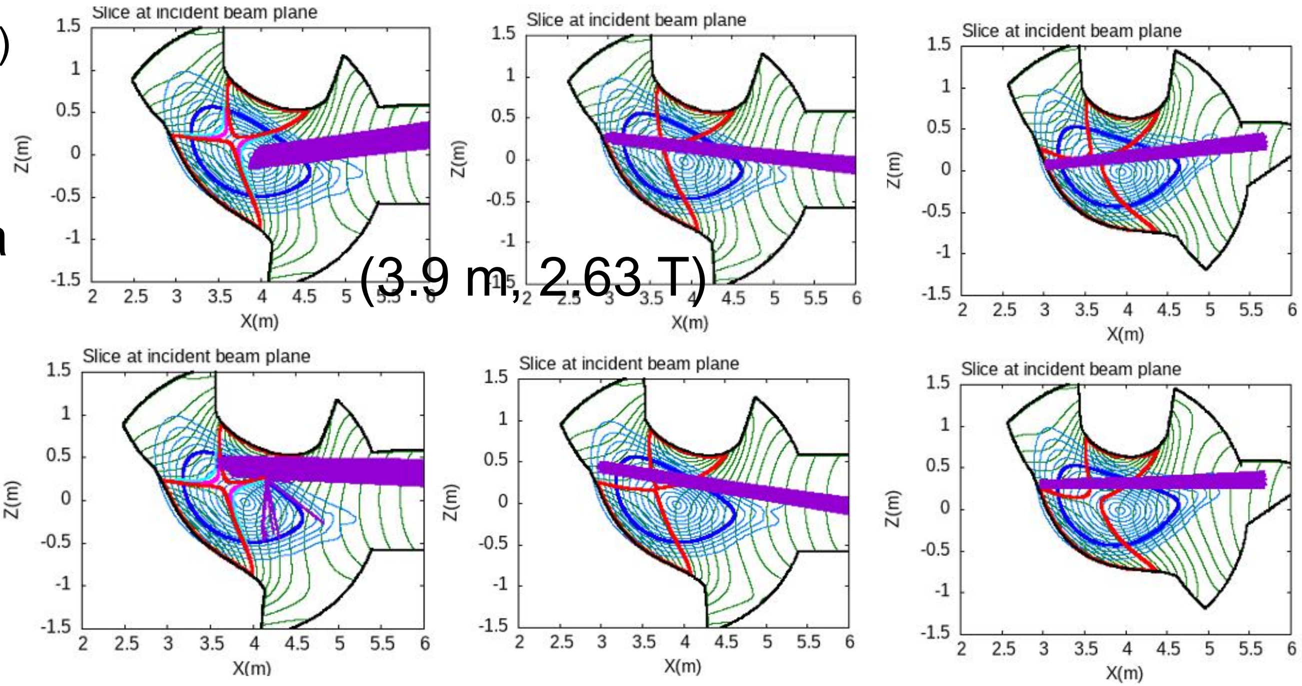
Observation of electron cyclotron maser instability (ECMI) during the fundamental X-mode ECCD in the extremely low dense plasma

H. Igami

Experimental conditions:

(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CW, 2.85 T, 1.2538, 100.0%)
#197186 - #197197
(R_{ax}, Polarity, B_t, γ, B_q) = (3.9 m, CW, 2.63 T, 1.2538, 100.0%)
#197210 - #197221

77GHz 2OUR, 1st X from 3.33s | 154GHz 2OLL, 2nd X from 3.37s | 154GHz 2OUL , 2nd X from 3.37s



Motivation and method:

- ECMI is considered as a mechanism of Aurora kilometric radiation caused by population inversion along v⊥ outside the mirror trapped region in the velocity space
- ECCD by 1st X-mode and 2nd X-mode was applied so that the power deposition region is around ρ~0.8 and ρ~0.4
- For ECCD around ρ~0.8, EC waves were launched from the high field side
- The IF signals of D, F, W bands were input into fast sampling oscilloscope (80Gs/s, 25ms) to get high resolution spectrograms
- NB3 is injected at the same time of 2OUR

Results:

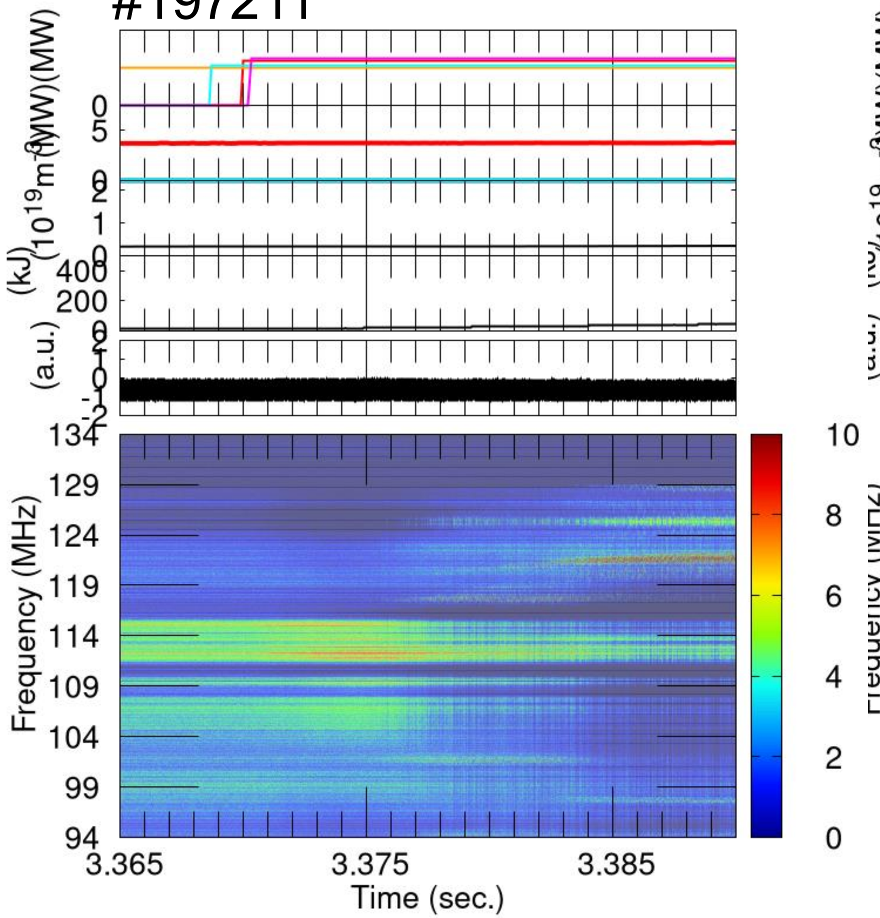
- The plasma was immediately initiated by the 1st X-mode (less than 10ms after the start of launching)
- ECE spectrograms and HX-ray signals will be checked

Observation of electron cyclotron maser instability (ECMI) during the fundamental X-mode ECCD in the extremely low dense plasma

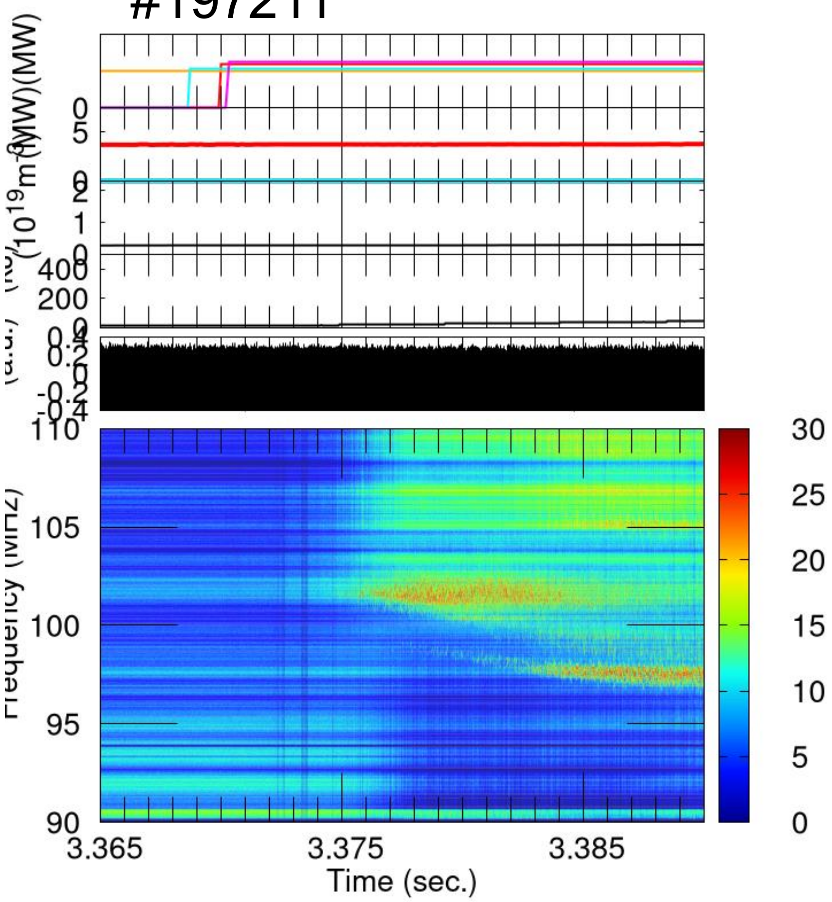
H. Igami

(R_{ax}, Polarity, B_t, γ, B_q) = (3.9 m, CW, 2.63 T, 1.2538, 100.0%)

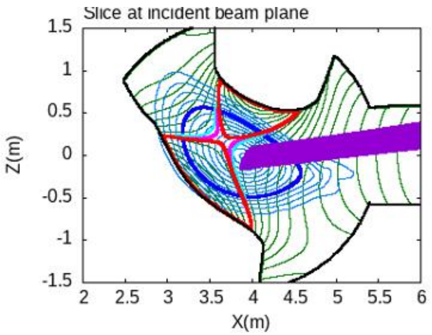
#197211



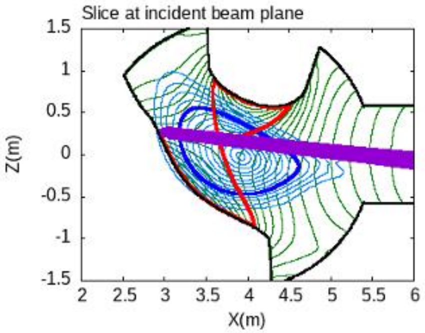
#197211



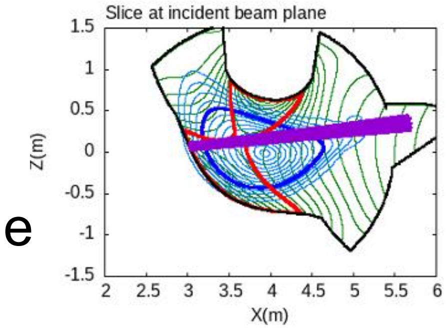
77GHz 2OUR, 1^{st} X



154GHz 2OLL, 2^{nd} X



154GHz 2OUL , 2^{nd} X



Intense frequency chirping emissions were observed after the 2^{nd} oblique X waves and the 1^{st} perpendicular O-mode (5.5UO) wave were launched toward the saddle point of the ECR layer